UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/964,938	09/27/2001	David F. Lowry	50005-44	2207

7590 06/14/2005

John M. Bradshaw
Woodard, Emhardt, Naughton, Moriarty and McNett
Bank One Center/Tower, Suite 3700
111 Monument Circle
Indianapolis, IN 46204-5137

EXAMINER	
STEVENS, THOMAS H	
ART UNIT	**PAPER NUMBER**
2123	

DATE MAILED: 06/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/964,938	LOWRY, DAVID F.	
	Examiner	Art Unit	
	Thomas H. Stevens	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 27 September 2001.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-37 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-37 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 27 September 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 12/26/02.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-37 were examined.

Information Disclosure Statement

2. The listing of references in the specification on pages 16 and 17 is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 1-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Felix Tutorials (Molecular Tutorials (March 2000)). Felix tutorials teaches 1D, 2D and 3D data processing for homonuclear, heteronuclear module modeling (pg. v).

Claim 1. A method comprising: forming a model of multi-dimensional spectroscopic information including at least one set of two or more mutually exclusive terms (pg. 2, 1D processing; pg. 20, 2D processing; pg. 47 3D processing), the set of terms formed from

at least first and second multi-dimensional spectroscopic data sets of a dimension less than the modeled multi-dimensional information, selecting only one of the set of mutually terms to represent the multi-dimensional spectroscopic information by fitting the model to a third multi-dimensional (pg. 47 3D processing) spectroscopic data set (pg. 49).

Claim 2. The method of claim 1 (pg. 2, 1D processing; pg. 20, 2D processing; pg. 47 3D processing; pg. 47 3D processing; pg. 49) wherein the first and second data sets share a common dimension and the second data set has at least one dimension orthogonal (pg. 47, orthogonality is a property of Fourier theory) to a dimension in the first data set (pg. 2, 1D processing)

Claim 3. The method of claim 2 (pg. 2, 1D processing; pg. 20, 2D processing; pg. 47 3D processing; pg. 47 3D processing; pg. 49; pg. 2, 1D processing) wherein the orthogonal dimensions are frequency dimensions and wherein the set of mutually exclusive terms include frequency and decay (pg. 7) rates determined from the first and second data sets.

Claim 4. The method of claim 1(pg. 2, 1D processing; pg. 20, 2D processing; pg. 47, 3D processing; pg. 47 3D processing; pg. 49) further comprising representing the multi-dimensional information with a model including only the selected term of the set of

mutually exclusive terms (pg. 47, orthogonality is a property of Fourier theory; mutual perpendicular property).

Claim 5. The method of claim 1 (pg. 2, 1D processing; pg. 20, 2D processing; pg. 47 3D processing; pg. 47 3D processing; pg. 49) wherein the set of mutually exclusive terms (pg. 47, orthogonality is a property of Fourier theory; mutual perpendicular property) include frequency and decay rates determined from the first and second data sets.

Claim 6. The method of claim 5 (pg. 2, 1D processing; pg. 20, 2D processing; pg. 47 3D processing; pg. 47 3D processing; pg. 49; pg. 47, orthogonality is a property of Fourier theory; mutual perpendicular property) wherein the first and second data sets are of dimension one less than the third data set (pg 50. “fraction”, user selected).

Claim 7. The method of claim 6 (pg. 2, 1D processing; pg. 20, 2D processing; pg. 47 3D processing; pg. 47 3D processing; pg. 49; pg. 47, orthogonality is a property of Fourier theory; mutual perpendicular property) wherein the third data set is an NMR spectrum (pg. 165).

Claim 8. The method of claim 7(pg. 2, 1D processing; pg. 20, 2D processing; pg. 47 3D processing; pg. 47 3D processing; pg. 49; pg. 47, orthogonality is a property of Fourier theory; mutual perpendicular property) wherein the third data set is a protein NMR spectrum (pg. 165).

Claim 9. The method of claim 1 (pg. 2, 1D processing; pg. 20, 2D processing; pg. 47 3D processing; pg. 47 3D processing; pg. 49) wherein the third data set is obtained at lower resolution than the first and second data sets (design choice; *In re Stevens*, 212 F.2d 197, 101 USPQ 284 (CCPA 1954)).

Claim 10. The method of claim 1 (pg. 2, 1D processing; pg. 20, 2D processing; pg. 47 3D processing; pg. 47 3D processing; pg. 49) further comprising: obtaining peak frequencies (pg. 126) and associated decay rates from the first and second data sets, and forming the set of mutually exclusive terms (pg. 47, orthogonality is a property of Fourier theory; mutual perpendicular property) with the obtained frequencies and associated decay rates.

5. Claims 11-34 and 37 are rejected under 35 U.S.C. 102(b) as being anticipated by Dunkel (U.S. Patent 5,572,125 (1996)). Dunkel teaches using regression analysis n-dimensional spectral and imaging data from sources including Nuclear Magnetic Resonance (NMR) (abstract).

Claim 11. A method of analyzing a physical object comprising: providing a series of stimuli (column 1, 24-31) to the object and determining the response of the object to the series of stimuli, varying the times between the stimuli in the series to form at least first and second multi-dimensional data sets of the response of the object to the series of stimuli (column 1, 24-31), forming a model of multi-dimensional information of a

dimension higher than the dimension of the first or second data sets (column 7, lines 35-55), the model including at least one set of terms where each term in the set represents a potential correlation between features (column 27, lines 25-30) of the first and second data sets, determining which term in the set represents the actual correlation between features of the first and second data sets (columns 7,8, lines 35-55 and 50-65, respectively) by comparing the model to a third multi-dimensional data set.

Claim 12. The method of claim 11 (column 1, 24-31; columns 7,8, lines 35-55 and 50-65, respectively; column 27, lines 25-30) wherein the features of the first and second data sets include frequency and decay (column 12, lines 443-46) rates.

Claim 13. The method of claim 11 (column 1, 24-31; columns 7,8, lines 35-55 and 50-65, respectively; column 27, lines 25-30) further comprising representing the multi-dimensional information with a model including the term determined to be representative of the correlation of features (column 1, 24-31; columns 7,8, lines 35-55 and 50-65, respectively; column 27, lines 25-30).

Claim 14. The method of claim 11 (column 1, 24-31; columns 7,8, lines 35-55 and 50-65, respectively; column 27, lines 25-30) wherein providing the series of stimuli and varying the times between the stimuli include performing a multi-dimensional NMR analysis of the object (column 1, lines 23-35).

Claim 15. The method of claim 11 (column 1, 24-31; columns 7,8, lines 35-55 and 50-65, respectively; column 27, lines 25-30) wherein the formed model includes a plurality of sets of terms, and the method further comprises selecting one from each of the sets of terms to represent the actual correlation of features in the first and second data sets (columns 7,8, lines 35-55 and 50-65, respectively).

Claim 16. The method of claim 11 (column 1, 24-31; columns 7,8, lines 35-55 and 50-65, respectively; column 27, lines 25-30) wherein the object is a protein.

Claim 17. The method of claim 16 (column 1, 24-31; columns 7,8, lines 35-55 and 50-65, respectively; column 27, lines 25-30) herein the protein is a heteronuclear (column 2, lines 25-32) labeled protein.

Claim 18. A device comprising (column 39, lines 7-45; column 38, lines 49-59): a computer readable media containing programming instructions (column 40, lines 36-66) for a multidimensional interrogation device the instructions operable to cause the multidimensional interrogation device to: form a model of multi-dimensional interrogation information including at least one set of terms where each term represents a potential correlation between features of at least first and second multi-dimensional data sets, the first and second data sets of a dimension less than the modeled information, and determine which term represents the actual correlation between

features of the first and second data sets by comparing the model to a third multi-dimensional data set (column 11, lines 33-55).

Claim 19. The device of claim 18 (column 39, lines 7-45; column 40, lines 36-66; column 11, lines 33-55; column 38, lines 49-59) wherein the instructions are operable to cause the interrogation device to fit the model to the third multi-dimensional data (column 21, lines 16-25, general case) set to determine which term represents the actual correlation between features.

Claim 20. The device of claim 19 (column 39, lines 7-45; column 40, lines 36-66; column 11, lines 33-55; column 21, lines 16-25, general case; column 38, lines 49-59) wherein the features of the first and second data sets include peak frequencies (column 6, lines 15-18) and associated decay (column 28, lines 2-4) rates.

Claim 21. The device of claim 18 (column 39, lines 7-45; column 40, lines 36-66; column 11, lines 33-55; column 38, lines 49-59) wherein the computer readable media (column 40, lines 36-66) is selected from the group consisting of floppy disks, magnetically encoded hard disks, tapes, cartridges and optical disks.

Claim 22. The device of claim 21 (column 39, lines 7-45; column 40, lines 36-66; column 11, lines 33-55; column 38, lines 49-59) wherein the multi-dimensional interrogation device includes a multi-dimensional NMR machine (column 37, lines 8-10).

Claim 23. The device of claim 22 column 39, lines 7-45; column 40, lines 36-66; column 11, lines 33-55; column 38, lines 49-59) wherein the features of the first and second data sets include peak frequencies (column 6, lines 15-18) and associated decay rates of multi-dimensional NMR data sets (column 37, lines 8-10).

Claim 24. A method comprising: forming at least one set of terms from at least first and second multi-dimensional spectroscopic data sets (column 37, lines 8-10) wherein each of the terms in the set is representative of potential correlations between features in the first and second data sets, (column 37, lines 30-49) determining which of the set of terms represents the actual con-elation between features of the multi-dimensional data sets by comparing the model to a third multi-dimensional spectroscopic data set, representing multi-dimensional spectroscopic information (column 37, lines 30-49) with the determined term.

Claim 25. The method of claim 24 (column 37, lines 8-10; column 37, lines 30-49) wherein determining which term represents the actual correlation between features includes fitting the model to the third multi-dimensional data set (general case: abstract “n-dimensional signal”).

Claim 26. The method of claim 24 (column 37, lines 8-10; column 37, lines 30-49) wherein the features of the first and second multi-dimensional data sets include peak frequencies (column 6, lines 15-18) and associated decay rates.

Claim 27. The method of claim 24 (column 37, lines 8-10; column 37, lines 30-49) wherein the at least first and second multi-dimensional spectroscopic data sets include NMR data sets (column 37, lines 8-10).

Claim 28. The method of claim 27 (column 37, lines 8-10; column 37, lines 30-49) wherein the NMR data sets are data sets from NMR analysis of biological material (proteins, column 33, lines 60-61).

Claim 29. The method of claim 24(column 37, lines 8-10; column 37, lines 30-49) wherein the third data set is obtained at lower resolution (column 3, lines 29-33) than the first and second data sets.

Claim 30. An apparatus comprising: a device carrying logic to: form a model of multi-dimensional information (column 14, lines 15-19) wherein the model includes at least one set of terms where each term represents a potential correlation between features in at least first and second multi-dimensional data sets of a dimensional less than the modeled information, select one of the set of terms for representing the multi-dimensional information by comparing the model to a third multi-dimensional data set (general case: column 14, lines 8-41).

Claim 31. The apparatus of claim 30 (column 14, lines 15-19; general case: column 14, lines 8-41) wherein the device also carries logic to determine the features in the first and second data sets (column 11, lines 46-55).

Claim 32. The apparatus of claim 30 (column 14, lines 15-19; general case: column 14, lines 8-41) wherein the device is a computer readable memory device (column 38, lines 49-54).

Claim 33. A method for determining multi-dimensional information (column 14, lines 15-19) concerning an object comprising: forming first and second multi-dimensional data sets representing projections of information concerning an object of a dimension one higher than the first and second data sets; correlating the first and second data sets to form a model of the multidimensional information concerning the object, (column 11, lines 35-55) the model including at least one set of terms where each term in the set represents a potential correlation between features in the first and second data sets; determining which of the terms represents the actual correlation of features in the first and second data sets by comparing the model to a third multi-dimensional data set representing information concerning the object (column 11, lines 35-45).

Claim 34. The method of claim 33 (column 14, lines 15-19; column 11, lines 35-55) wherein the third data set is obtained at lower resolution (column 3, lines 29-33) that the first and second data sets.

Claim 37. The method of claim 11 (column 1, 24-31; columns 7,8, lines 35-55 and 50-65, respectively; column 27, lines 25-30) wherein the term representing the actual correlation between features of the first and second data sets is determined by minimizing a term quantifying the difference between data from the third data set and corresponding output of the modeled information.

Claim Rejections - 35 USC § 103

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 35 and 36 are rejected under 35 U.S.C. 103 (a) as obvious by Felix Tutorials (Molecular Tutorials (March 2000)), in view of Andersen et al. (U.S. Patent 6,709,814 (2004)). Felix tutorials teaches 1D, 2D and 3D data processing for homonuclear,

heteronuclear module modeling (pg. v); but doesn't teach least squares. Andersen et al., teaches is directed to compositions and methods including pesticides and peptides for library screening (abstract), with least squares capability (column 35, lines 25-34).

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify Felix by way of Andersen et al.to assist in identifying in virto binding proteins and small molecules capable of binding proteins and other small molecules (column 3, lines 33-37).

Claim 35. The method of claim 1 (Felix: pg. 2, 1D processing; pg. 20, 2D processing; pg. 47 3D processing; pg. 47 3D processing; pg. 49) wherein fitting the model to a third multi-dimensional data set includes extremizing an error term quantifying the difference between data from the third data set (structured activity relationships; Andersen: 35, lines 28-30) and the modeled multi-dimensional spectroscopic information.

Claim 36. The method of claim 35 (Felix: pg. 2, 1D processing; pg. 20, 2D processing; pg. 47 3D processing; pg. 47 3D processing; pg. 49) wherein fitting the model includes performing a linear least squares fit (Andersen: 35, lines 28-30).

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mr. Tom Stevens whose telephone number is 571-272-3715, Monday-Friday (8:00 am- 4:30 pm) or contact Supervisor Mr. Leo Picard at (571) 272-3749. Fax number is 571-273-3715.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100.

June 2, 2005

W Thomas
Primary Examiner
TC 2100
AU 2123

THS